Subject: FAA Inter-Agency Agreement to NASA Ames, Moffett Field, CA

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Project Title: Discrimination Model To Predict Night Vision Goggle Target Detection

Duration: One Year; Anticipated Award Date June 15th, 2002

Project Summary:

"Pilots flying under FAR Part 91 only require a Class 3 flight physical. This allows the pilot to have uncorrected or corrected 20/40 vision and still be qualified to fly at night. Night vision goggles (NVGs) have only been tested with pilots that have vision correctable to 20/20. The effect of allowing pilots with vision less than 20/20 to fly with NVGs is currently unknown" (Simpson, Turpin, and Gardner, 2001, report entitled "Human Factors Issues for Civil Aviation use of Night Vision Goggles").

Objectives

To develop an image discrimination model that can predict the detectability of targets for different image-intensifier tubes.

The MATLAB Image Discrimination model will be used to analyze observers' detectability of targets as seen through different types of NVGs (figure 1). The model's parameters will include noise, blur, spatial frequency, and luminance to determine how these effects influence pilots' detectability and readability of a target (e.g., grating or plane). The model will predict an observer's detectability by comparing two scenes – one scene with a target and the other scene without the target. Detectability will be defined as d prime which is a level of sensitivity commonly used by behavioral scientists.

The MATLAB model will be robust to allow the user to compare two images (.tiff file format) to determine the effects of NVG tube quality by observer visual acuity. The user will be able to compare d prime values between a given resolution for a particular NVG tube.

Benefits to the FAA and the aviation maintenance industry:

- It will determine observers' NVG detectability for different visual acuities, e.g, 20/10, 20/20, 20/40, 20/60, 20/80, …, 20/200, across the three different NVG tubes (40, 50, and 64 lp/mm).